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SPECIFICATIONS

FOR A

THIRD ORDER LANTERN.

PREPARED AT THE OFFICE OF THE LIGHT-HOUSE BOARD,
TREASURY DEPARTMENT.

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SPECIFICATIONS

FOR A

THIRD ORDER LANTERN.

When the lantern is to have an iron parapet, it will be made as shown and described on the drawings and in the specifications for Shell Keys light-house, differing only as follows: the glass in each face of the lantern is to be an entire plate, instead of in three pieces, as shown and described in said drawings and specifications.

When a brick parapet is used, the lantern will be constructed as shown on Plates 22, 22 I, 22 III, 22 IV, 22 V, and 22 VI, of the United States Light-house Portfolio, and in accordance with the following specifications:

Lantern for a
masonry para-
pet.

The plan of the lantern is a regular polygon of ten (10) sides. The principal parts are: the gallery, forming the base; the metal framing of sash-bars for the plate glass; and the domical roof and ventilator.

The gallery will consist of ten (10) cast-iron segments, Gallery plates made as shown on Plate 22, VI, and secured together with thirty (30) bolts, (instead of twenty as drawn,) made of wrought iron, tool-finished, and each $\frac{9}{16}$ of an inch diameter. The segments, when joined together, form a circular plate 11 feet 9 inches extreme diameter, with a central opening for the lens apparatus 4 feet 1 inch diameter. In order to accommodate the stairway inside of the lantern, two of the segments will have their inner ends "stopped off" at the line CDE; another of the remaining segments must contain a stove-pipe hole $5\frac{1}{2}$ inches diameter.

The radial joints, and the upper surface in contact with the mullion sill, must be planed; the sockets for the railing standards must be bored and faced. The upper surfaces of the segments, where not planed, must be checkered or roughened to the depth of $\frac{3}{32}$ of an inch. Least thickness of metal in the segment $\frac{1}{2}$ an inch.

There will be ten (10) wrought-iron railing standards Gallery railing inserted in the sockets formed at the joints of the gallery segments, having their centres 2 inches from the outer edge. The length of each standard between the

socket and rail is $17\frac{3}{4}$ inches; diameter at the lower part 1 inch; diameter at the top $\frac{7}{8}$ inch. The lower end will be tool-finished, and secured with a tool-finished wrought-iron nut and washer. The upper end will pass through and secure the rail by means of a finished brass nut, having a closed end; diameter of screw $\frac{5}{8}$ inch.

(The nut is erroneously marked "cast iron" on the drawing.)

The rail will be a wrought-iron ring, 11 feet $6\frac{1}{2}$ inches extreme diameter, made in segments, and fastened together by means of half-lap joints; two countersunk screws, $\frac{1}{2}$ inch diameter, passing through each lap. The size of iron for the rail is $1\frac{1}{2}'' \times \frac{1}{2}''$.

Lantern posts. Ten (10) wrought-iron lantern posts, whose dimensions, when finished, are $2\frac{3}{8}$ inches wide, 1 inch thick, and 7 feet $6\frac{1}{2}$ inches long, are set vertically, at equal distances apart around the base, with their inner edges 4 feet $1\frac{1}{16}$ inches from the axis of the lantern. Nine (9) of the posts extend 1 foot $3\frac{7}{8}$ inches, and the *tenth* only 8 inches below the mullion sills into the brick-work. The shorter post is to clear the door frame in the parapet.

Grooves for glass.

Each post must be lined on the outside with brass rebates and stops for the plate glass; each made in two parts; each rebate is secured to the post with four (4) brass screws $\frac{1}{4}$ inch diameter. The upper glass stop is fastened with five (5) brass screws, three of which secure the handle to it. The lower stop is secured with three brass screws $\frac{1}{4}$ inch diameter. The fronts of the iron lantern posts, all sides of the rebates and glass stops, must be planed. The brass handles must be finished all over.

Mullion sills.

The mullion sills are shown on Plate 22, IV, where they are marked "cast iron." They must, however, while retaining the same general dimensions, excepting the thickness, be made of brass; their length being equal to the space between the lantern posts, width $3\frac{1}{16}$ inches, height 4 inches, least thickness $\frac{5}{16}$ inch; thickness of flanges $\frac{5}{8}$ inch. The rebates and glass stops, the end flanges and the under sides in contact with the gallery plates, must all be planed. Each glass stop will be secured with four (4) brass screws $\frac{1}{4}$ inch diameter. The sills will be secured to each lantern post with one wrought-iron tool-finished bolt, $\frac{3}{4}$ inch diameter, furnished with a suitable nut and washer; and to each gallery plate with two wrought-iron tap-bolts $\frac{1}{2}$ inch diameter.

Mullion caps.

The mullion caps will be of cast iron, of the form and dimensions shown on the drawings. The rebates, glass stops, and end flanges, must be planed. The glass stops to be of brass, and secured with the same number and kind of screws as are used for those of the mullion sills.

The mullion caps will be secured to each lantern post with one wrought-iron tool-finished bolt $\frac{3}{4}$ inch diameter. The tops of all the lantern posts are further united by fastening thereon a regular polygon of bar iron $2\frac{3}{8}'' \times \frac{3}{4}''$, finished size, secured by ten (10) screws $\frac{5}{8}$ inch diameter, which also pass through and secure the lower ends of the ribs of the dome. The polygon is made in three (3) segments, secured together with half-lap joints $4\frac{1}{2}$ inches long. Through each joint there are 2 screws $\frac{5}{8}$ inches diameter.

DOME.

The ribs and tie-bars forming the frame of the dome to be of wrought iron—the ribs $1\frac{1}{2}'' \times \frac{5}{8}''$; tie-bars $1\frac{1}{2}'' \times \frac{1}{2}''$. Each rib is an arc of a circle, with an internal radius of 4 feet $\frac{1}{8}$ inch. The lower end has a vertical and a horizontal flange, and is secured to the lantern post with two wrought-iron tap-bolts $\frac{5}{8}$ inch diameter—one through each flange; the upper end has a single vertical flange, and is fastened to the cast-iron crown piece with one bolt $\frac{1}{2}$ inch diameter. The tie-bars must be secured to each rib with two wrought-iron bolts $\frac{1}{2}$ inch diameter.

Framing of dome.

The cornice of dome is supported by ten (10) cast-iron brackets, of the form and dimensions shown on Plate 22, III.

Cornice.

Each bracket is set upon and secured to the wrought-iron polygon on the lantern posts with two tap-bolts $\frac{5}{8}$ inch diameter. The upper ends of all the brackets are united by a wrought-iron ten-sided polygon, made in segments, having half-lap joints 4 inches long, at which they are secured together by two countersunk $\frac{1}{2}$ -inch screws passing through each. Size of iron for the polygon is $1\frac{1}{2}'' \times \frac{1}{2}''$. It is secured to each bracket with one countersunk screw $\frac{1}{2}$ inch diameter.

The spider-frame supporting the adjustable bearing for the upper part of the lens apparatus, is to be of wrought iron, of the form and dimensions shown on Plate 22, V. The tie-rods, ten (10) in number, are $1'' \times \frac{5}{8}''$. The outer end of each has a jaw formed on it, whereby it is secured to the rib of dome with one wrought-iron tool-finished bolt $\frac{1}{2}$ inch diameter. (The jaw is wrongly represented on the drawing; it should be so placed as to permit the bolt just mentioned to be perpendicular to the flat side of the bar.)

Spider frame.

The inner end of each tie-rod has a screw cut on it $\frac{5}{8}$ inch diameter, whereby it is secured to a wrought-iron ring, with nuts inside and out for adjustment. The tie-ring is $11\frac{1}{2}$ inches external diameter, and in section is $1\frac{1}{2}'' \times \frac{1}{16}''$. Each alternate tie-rod is supported by a

wrought-iron rod $\frac{1}{2}$ inch diameter, (instead of $\frac{5}{8}$ inch diameter as drawn,) whose upper end is secured to the rib of dome, at a distance of $10\frac{1}{4}$ inches from the axis of lantern, with a wrought-iron bolt $\frac{3}{8}$ inch diameter. The lower end is secured to the tie-rod with a same sized bolt. Cast-iron turnbuckles 3 inches long, with right and left screws cut in them, are provided for adjustment.

Adjustable
bearing for lens
apparatus.

The bearing for the spindle on the upper part of the lens apparatus, consists of a central socket $2\frac{3}{4}$ inches diameter by $1\frac{1}{8}$ inches deep, with four arms placed at equal distances apart, each of which passes through a seat, and is adjustable therein by two $\frac{3}{8}$ -inch set screws. The seats have two flanges each, by which they are fastened to the wrought-iron tie-ring with four countersunk screws $\frac{1}{4}$ inch diameter. All parts of the bearing and seats are of brass, and must be finished all over. The upper side of tie-ring must be faced.

Copper dome.

The dome must be covered with sheet copper, weighing not less than 32 ounces per superficial foot, laid on in ten (10) equal segments, with lock-joints, tinned, except below the eaves, where it is to be tinned only for soldering. The segments must be secured to each rib with four brass screws $\frac{3}{8}$ inch diameter. The roofing extending downwards along the brackets, is fastened to the glass stops of the mullion caps with the same screws which secure said glass stops.

Water spout.

At every other bracket, one copper water-spout is placed, for conducting the water from the roof.

Ventilator.

The globe, and other parts of ventilator, are to be made of sheet copper, weighing 32 ounces per square foot. The globe is $22\frac{1}{4}$ inches diameter, and has in its lower part thirty-six (36) holes 2 inches in diameter, arranged in two rows. The ventilator pipe is 12 inches diameter; its lower part is moulded in the form of a scotia, the base of which is 22 inches diameter, having on it a flange 3 inches wide, which will be riveted and soldered to the dome when finally erected upon the lighthouse. The upper part of the pipe is perforated with fourteen (14) rectangular openings, each $3\frac{3}{16}$ " \times $1\frac{5}{8}$ ". The globe passes over the pipe, to which it is secured with eight copper rivets $\frac{1}{4}$ inch diameter.

Pinnacle.

A brass nut and copper pinnacle are soldered to the top of the globe. The total height of the nut is $5\frac{3}{4}$ inches; diameter of its base $5\frac{7}{8}$ inches; diameter of body 2 inches; inside screw $1\frac{1}{4}$ inches diameter. The pinnacle projects four (4) feet above the nut into which it is screwed, and must be furnished at the top with a platinum point worth \$4. The diameter of the lower part of pinnacle is $1\frac{1}{4}$ inches, tapering to $\frac{1}{2}$ inch at the top.

The cast-iron crown piece of dome is shown on Plate 22, V. It consists of a polygonal ring, having an internal diameter of 11 inches; depth $3\frac{1}{2}$ inches; least thickness $\frac{1}{2}$ inch. All the ribs of the dome are clustered together, and let into the notches on the outside of the ring, to which they are also bolted. Crown piece
of dome

The crown piece has five arms $3\frac{1}{4}'' \times \frac{1}{2}''$, sustaining a central socket 3 inches diameter by $4\frac{1}{2}$ inches long, into which a wrought-iron bolt $1\frac{1}{4}$ inches diameter enters, and is secured by means of its collar and a nut and washer of suitable size. The bolt passes upward, and is screwed into the nut on the top of the globe, thereby fixing all parts of the ventilator firmly together, and to the dome. The socket in the crown piece must be bored and faced, and the bolt turned to fit it. The notches for the ribs must be planed.

The inside of dome must be lined with sheet zinc $\frac{1}{8}$ of an inch thick, put on in ten (10) segments, with $\frac{3}{4}$ inch lap at the joints, and fastened to each rib with five (5) wrought-iron screws $\frac{1}{4}$ inch diameter. Inside lining
of dome.

The copper roof plates must have their lock-joints all prepared when they leave the workshop, so that they may be lowered in their places, and only require the joints to be flattened and secured when at the light-house.

To prevent any leakage or condensation of vapor from falling upon the lens apparatus, a cone and cowl, formed of the best XX tin, is placed over it, and fastened with five (5) screws to the horizontal tie-rods. (See Plate 22, III.) Tin shelter
for lens.

There will be five (5) air registers, made as shown on 22, I. The pipe and cowl to be of sheet copper, weighing 32 ounces per superficial foot. Least external diameter of pipe 4 inches; diameter of enlarged end for the valve seat 6 inches. All its parts must be securely brazed together. The valve and seat to be of brass; extreme diameter 7 inches; least thickness $\frac{1}{4}$ inch; to be finished all over.

The seat and slide to contain four triangular-shaped openings, so arranged that when the register is closed the solids should lap the voids $\frac{1}{16}$ of an inch. The registers will be suitably distributed around in the parapet, care being taken not to interfere with the other metal work.

A wrought-iron ladder for the lantern gallery, made as shown on Plate 22, I, must be provided. There will be two stringers, each $2'' \times \frac{3}{8}''$, and 7 feet long, placed 12 inches apart from out to out. The treads are 9 inches apart, and consist of two rods $\frac{1}{2}$ inch diameter, placed $1\frac{1}{4}$ inches apart from centre to centre; the line connecting the

centres forming an angle of 80° with the stringers. The rods are reduced to $\frac{1}{4}$ inch diameter where they enter the stringers, to which they must be riveted.

Painting.

After inspection at the workshop, all parts of the lantern (except bolts, screws, and surfaces of joints) must have two (2) coats of white lead in oil. When finally erected, the lantern must have two (2) additional coats of paint of such color as may be directed, (generally white inside and black outside.)

The surfaces of joints, also all bolts and screws, must be well smeared with a mixture of white lead and tallow, which, when necessary, may be removed by applying a gentle heat.

Marking.

All parts of the work must be properly marked with a chisel or centre punch, when the materials will bear it; when otherwise, it must be painted.

Boxing.

All parts of the lantern must be substantially boxed and strapped with iron. Contents of each box marked on its outside. All castings must be made perfectly sound and true, or they *will be rejected*. The wrought iron must be of the best quality, made from charcoal blooms, tough and fibrous. The entire work must be erected and fitted together at the workshop, and executed in the best manner, to the satisfaction of an authorized agent of the Light-house Board.

BILL OF MATERIALS.

Cast Iron.

- 10 Gallery plates.
- 10 Mullion caps.
- 10 Brackets for cornice.
- 1 Centre piece for ribs of dome.
- 5 Screw couplings for tie-rod supporters.

Wrought Iron.

- 10 Lantern posts.
- 10 Ribs for dome.
- 10 Tie-bars between ribs of dome.
- 3 Segments on top of lantern posts.
- 3 Segments on top of brackets.
- 3 Segments for gallery railing.
- 10 Standards for gallery railing.
- 10 Nuts for lower parts of railing standards.
- 5 Tie-rod supporters.
- 1 Bolt, with collar and nut, for fastening ventilator to dome.
- 1 Ring for tie-rods.
- 1 Ladder.

Brass.

- 10 Mullion sills.
- 20 Rebates in front of lantern posts.
- 40 Glass stops.
- 1 Adjustable bearing on tie-rods.
- 4 Seats for ditto.
- 1 Nut on top of globe.
- 10 Handles on lantern posts.
- 5 Air register seats and slides.
- 10 Nuts for upper ends of railing standards.

Copper.

- 10 Roof and cornice segments.
- 1 Globe.
- 1 Ventilator pipe and base.
- 5 Pipes and cowls for air registers.

Zinc.

- 10 Segments for inside lining of roof.

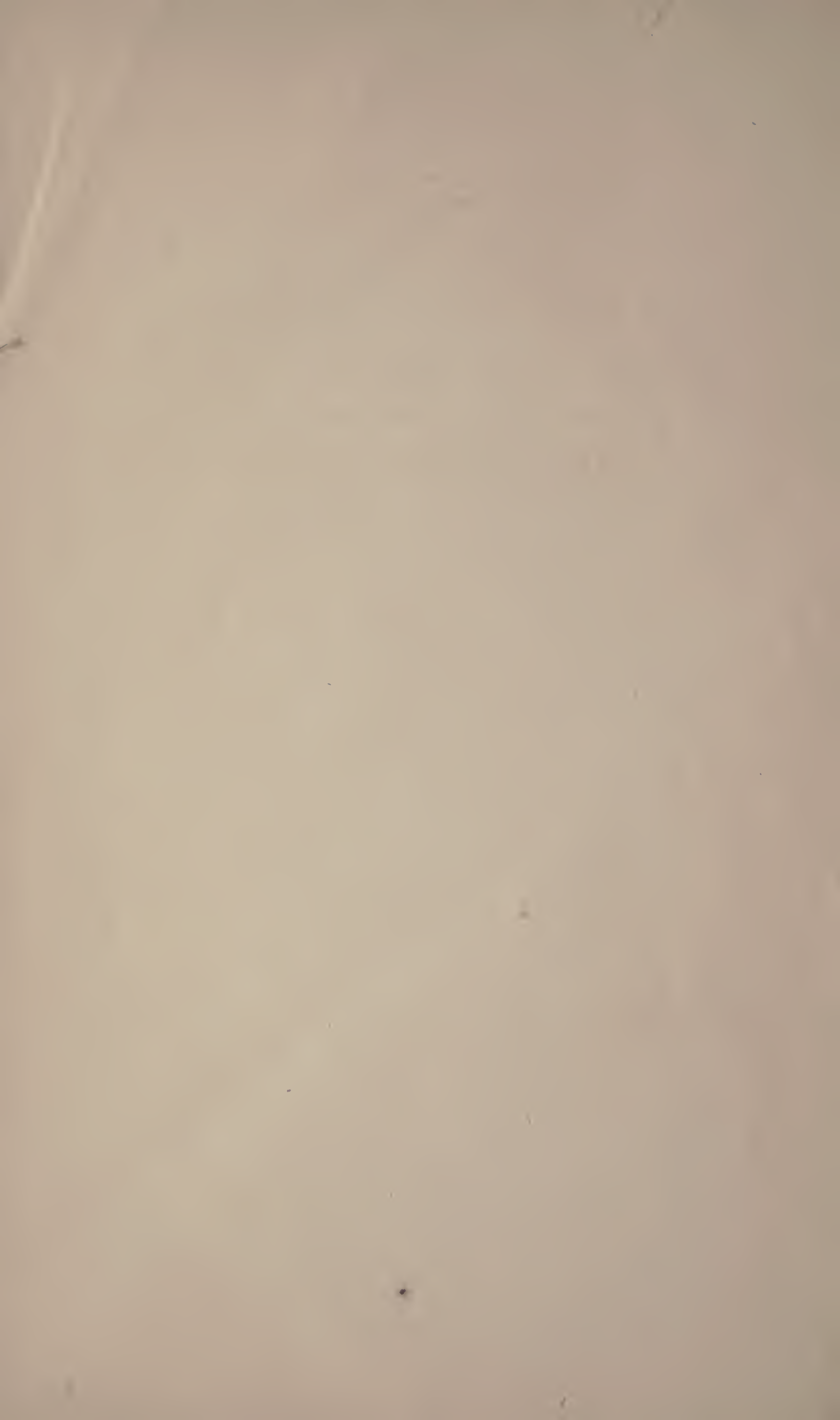
Tin.

Shelter for lens.

Bolts and Screws.

	Diameter.	Whole Length.
	<i>Inches.</i>	<i>Inches.</i>
20 Tap-bolts for ribs and segments on lantern posts	$\frac{5}{8}$	—
20 Bolts and nuts for securing mullion caps and sills	$\frac{3}{4}$	$3\frac{3}{4}$
30 Bolts and nuts for securing gallery plates	$\frac{9}{16}$	$2\frac{1}{16}$
20 Tap-bolts for feet of cornice brackets	$\frac{5}{8}$	2
20 Bolts and nuts for bars between ribs of dome.	$\frac{1}{2}$	$2\frac{5}{8}$
10 Bolts and nuts for fastening ribs to crown piece.	$\frac{1}{2}$	2
10 Bolts and nuts for tie-rods	$\frac{1}{2}$	$2\frac{3}{8}$
10 Bolts and nuts for tie-rod supporters. .	$\frac{3}{8}$	$2\frac{3}{8}$
20 Tap-bolts for securing mullion sills to gallery plates	$\frac{1}{2}$	$2\frac{1}{2}$
8 Tap-bolts for connecting segments on lantern posts	$\frac{1}{2}$	$1\frac{1}{4}$
8 Screws for connecting segments on cornice brackets.	$\frac{1}{2}$	$\frac{1}{2}$

		Diameter.	Whole Length.
		<i>Inches.</i>	<i>Inches.</i>
10	Screws for connecting segments on cornice brackets	$\frac{1}{2}$	1
8	Screws for connecting segments of gallery railing	$\frac{1}{2}$	$1\frac{1}{2}$
8	Set screws for adjustable bearing	$\frac{3}{8}$	$2\frac{5}{16}$
16	Screws for securing seats of ditto	$\frac{1}{4}$	$\frac{5}{8}$
80	Screws for securing rebates to lantern posts	$\frac{1}{4}$	$1\frac{7}{16}$
160	Screws for securing glass stops and handles	$\frac{1}{4}$	1
40	Screws for securing copper plates to ribs of dome	$\frac{3}{8}$	$1\frac{3}{16}$
50	Screws for securing inside lining of dome	$\frac{1}{4}$	$\frac{7}{8}$



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